CLAIMS

I CLAIM:

1. A method of evaluating mathematical model parameters describing Euler angles and directions, and magnitudes of real and imaginary components, of orthogonally related Kramers-Kroenig consistent complex dielectric functions or refractive indicies in an optically thick material system which presents with an optical axis oriented in a selection from the group consisting of:

in-plane; and
out-of-plane;

with respect to an alignment surface thereof, said optically thick material system being uniaxial in that corresponding real and corresponding imaginary components of at least two orthogonally related optically thick material system characterizing diagonalized tensor:

$$\bar{\varepsilon}(E)=\begin{bmatrix}\varepsilon_{sc} & 0 & 0\\ 0 & \varepsilon_{sc} & 0\\ 0 & 0 & \varepsilon_{pc}\end{bmatrix}$$

complex dielectric functions or refractive indicies are of equal magnitude, said method comprising, in any functional order, the steps of:

a. providing an optically thick material system which presents with Kramers-Kroenig consistent complex dielectric functions or refractive indicies and with an optical axis oriented either in-plane or out-of-plane with respect to an alignment surface

thereof, said optically thick material system being uniaxial in that corresponding real and corresponding imaginary components of at least two orthogonally related optically thick material system characterizing diagonalized tensor:

$$\tilde{\varepsilon}(E)=\begin{bmatrix}\varepsilon_{sc} & 0 & 0\\ 0 & \varepsilon_{sc} & 0\\ 0 & 0 & \varepsilon_{pc}\end{bmatrix}$$

complex dielectric functions or refractive indicies are of equal magnitude;

b. placing said optically thick material system into a system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface, said system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface comprising a reflection detector system;

c. selecting at least one spectroscopic polarized electromagnetic beam(s) of radiation to at least partially comprise wavelengths for which said optically thick material system is non-transparent, and causing said at least one beam(s) of spectroscopic polarized electromagnetic radiation to impinge on said alignment surface of said optically thick material system, at at least one angle(s) of incidence removed from a normal to said alignment surface, in plane(s) of incidence which include the locus of said beam of spectroscopic polarized electromagnetic radiation and said normal to said alignment surface, said at least one beam(s) of spectroscopic polarized

electromagnetic radiation being caused to reflect from said alignment surface of said optically thick material system and into said reflection detector system;

d. at said at least one angle(s) of incidence and at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining reflection detector system mediated experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface;

e. simultaneously providing a mathematical model of said optically thick material system which includes as parameters therein at least:

real and imaginary components for each of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies;

sufficient rotation about a normal to an alignment surface, and deviation from alignment with said alignment surface angle parameters to define the orientations of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies, and orientation of the optical axis, with respect to the alignment surface; and

Euler angles relating material system angles to a laboratory frame of reference; and

f. via application of a mathematical regression technique,

evaluating parameters in said mathematical model to provide a best-fit to acquired experimental data.

2. A method of evaluating mathematical model parameters as in Claim 1, in which the step of, at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface, involves obtaining experimental reflection data at at least two angles of incidence.

3. A method of evaluating mathematical model parameters as in Claim 1, in which the step of, at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface, involves obtaining experimental reflection data at at least two angles of incidence and at two or more rotation angles of said optically thick material system around said normal to the alignment surface thereof.

4. A method of evaluating mathematical model parameters as in Claim 1, in which the step of, at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface, involves obtaining experimental reflection data at two rotation angles of said optically thick

material system around said normal to the alignment surface thereof, said two rotation angles being appropriate to sequentially align a plane of incidence of said at least one spectroscopic polarized electromagnetic beam of radiation along the direction of an in-plane projection of two of the orthogonally related complex dielectric functions or refractive indicies which have equal magnitude corresponding real and equal magnitude corresponding imaginary components.

5. A method of evaluating mathematical model parameters as in Claim 1, in which the step of, at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface, involves obtaining experimental reflection data at two rotation angles of said optically thick material system around said normal to the alignment surface thereof, said two rotation angles being appropriate to sequentially align a plane of incidence of said at least one spectroscopic polarized electromagnetic beam of radiation along the direction of an in-plane projection of one of said two orthogonally related dielectric functions or refractive indicies which have equal magnitude corresponding real and equal magnitude corresponding imaginary components, and further involves obtaining experimental reflection data with said plane of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation oriented along a direction rotationally between the directions of said in-plane projections of said two orthogonally related complex dielectric functions or refractive indicies which have equal magnitude corresponding real and equal magnitude corresponding imaginary components.

6. A method of evaluating mathematical model parameters as in

Claim 4, in which the step of, at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface, involves obtaining experimental reflection data at at least two angles of incidence at each rotation angle.

7. A method of evaluating mathematical model parameters as in Claim 5, in which the step of, at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface, involves obtaining experimental reflection data at at least two angles of incidence at each rotation angle.

8. A method of evaluating mathematical model parameters as in Claim 1, in which a optically thick material system is provided that has the optical axis oriented out-of-plane with respect to said alignment surface, and in which the steps of obtaining experimental reflection data at at least one angle(s) of incidence of said at least one beam of spectroscopic electromagnetic radiation removed from a normal to said alignment surface, involves causing at said least one beam of spectroscopic polarized electromagnetic radiation to sequentially impinge on said alignment surface of said optically thick material system along two or more angles of incidence removed from a normal to said alignment surface are utilized.

9. A method of evaluating mathematical model parameters as in

Claim 1, in which a optically thick material system is provided that has the optical axis oriented in-plane with respect to said alignment surface, and in which the steps of obtaining experimental reflection data at at least one angle(s) of incidence of said at least one beam of spectroscopic electromagnetic radiation removed from a normal to said alignment surface, involves causing at said least one beam of spectroscopic polarized electromagnetic radiation to sequentially impinge on said alignment surface of said optically thick material system along two or more angles of incidence removed from a normal to said alignment surface are utilized.

10. A method of evaluating mathematical model parameters as in Claim 1, wherein said mathematical regression technique involves reduction of square-error.

11. A method of evaluating mathematical model parameters as in Claim 1, which further comprises providing a transmission detector and obtaining transmission data at at least one angle(s) of incidence of said at least one beam of spectroscopic electromagnetic radiation removed from a normal to said alignment surface.

12. A method of evaluating mathematical model parameters describing directions, and magnitudes of real and imaginary components, of orthogonally related Kramers-Kroenig consistent complex dielectric functions or refractive indicies in an optically thick material system which presents with an optical axis oriented in a selection from the group consisting of:

in-plane; and
out-of-plane;

with respect to an alignment surface thereof, said optically

thick material system being at least uniaxial in that corresponding real and corresponding imaginary components of at least two orthogonally related optically thick material system characterizing diagonalized tensor:

$$\tilde{\varepsilon}(E)=\begin{bmatrix}\varepsilon_{sc} & 0 & 0\\ 0 & \varepsilon_{sc} & 0\\ 0 & 0 & \varepsilon_{pc}\end{bmatrix}$$

complex dielectric functions or refractive indicies are of equal magnitude, said method comprising, in any functional order, the steps of:

a. providing at least two optically thick material systems which each present with Kramers-Kroenig consistent complex dielectric functions or refractive indicies and with an optical axis oriented either in-plane or out-of-plane with respect to an alignment surface thereof, each said optically thick material system being at least uniaxial in that corresponding real and corresponding imaginary components of at least two orthogonally related optically thick material system characterizing diagonalized tensor:

$$\tilde{\varepsilon}(E)=\begin{bmatrix}\varepsilon_{sc} & 0 & 0\\ 0 & \varepsilon_{sc} & 0\\ 0 & 0 & \varepsilon_{pc}\end{bmatrix}$$

complex dielectric functions or refractive indicies are of equal magnitude;

said method further comprising, for each said optically thick material system:

b. placing said optically thick material system into a system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface, said system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface comprising a reflection detector system;

c. selecting at least one spectroscopic polarized electromagnetic beam(s) of radiation to at least partially comprise wavelengths for which said optically thick material system is non-transparent, and causing said at least one beam(s) of spectroscopic polarized electromagnetic radiation to impinge on said alignment surface of said optically thick material system, at at least one angle(s) of incidence removed from a normal to said alignment surface, in plane(s) of incidence which include the locus of said beam of spectroscopic polarized electromagnetic radiation and said normal to said alignment surface, said at least one beam(s) of spectroscopic polarized electromagnetic radiation being caused to reflect from said alignment surface of said optically thick material system and into said reflection detector system;

d. at said at least one angle(s) of incidence and at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining reflection detector system mediated experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface;

e. simultaneously providing a mathematical model of said

optically thick material system which includes as parameters therein at least:

real and imaginary components for each of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies;

sufficient rotation about a normal to an alignment surface, and deviation from alignment with said alignment surface angle parameters to define the orientations of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies, and orientation of the optical axis, with respect to the alignment surface; and

Euler angles relating material system angles to a laboratory frame of reference; and

and wherein said method further comprises:

f. via application of a mathematical regression technique, simultaneously evaluating parameters in said mathematical models for each of the investigated optically thick material systems to provide a best-fit to acquired experimental data.

13. A method of evaluating mathematical model parameters describing directions and magnitudes of real and imaginary components of orthogonally related Kramers-Kroenig consistent complex dielectric functions or refractive indicies in a optically thick material system which presents with an optical axis oriented in a selection from the group consisting of:

in-plane; and

out-of-plane;

with respect to an alignment surface thereof, said optically thick material system being biaxial in that corresponding real and corresponding imaginary components of said orthogonally related optically thick material system characterizing diagonalized tensor:

$$\tilde{\varepsilon}(E) = \begin{bmatrix} \varepsilon_{sc} & 0 & 0 \\ 0 & \varepsilon_{sc} & 0 \\ 0 & 0 & \varepsilon_{pc} \end{bmatrix}$$

complex dielectric functions or refractive indicies, are unequal in magnitude;

said method comprising, in any functional order, the steps of:

a. providing an optically thick material system which presents with Kramers-Kroenig consistent complex dielectric functions or refractive indicies and with an optical axis oriented either in-plane or out-of-plane with respect to an alignment surface thereof, said optically thick material system being uniaxial in that corresponding real and corresponding imaginary components of said orthogonally related optically thick material system characterizing diagonalized tensor:

$$\tilde{\varepsilon}(E) = \begin{bmatrix} \varepsilon_{sc} & 0 & 0 \\ 0 & \varepsilon_{sc} & 0 \\ 0 & 0 & \varepsilon_{pc} \end{bmatrix}$$

complex dielectric functions or refractive indicies are unequal in magnitude;

b. placing said optically thick material system into a system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface, said system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface comprising a reflection detector system;

c. selecting at least one spectroscopic polarized electromagnetic beam(s) of radiation to at least partially comprise wavelengths for which said optically thick material system is non-transparent, and causing said at least one beam(s) of spectroscopic polarized electromagnetic radiation to impinge on said alignment surface of said optically thick material system, at at least one angle(s) of incidence removed from a normal to said alignment surface, in plane(s) of incidence which include the locus of said beam of spectroscopic polarized electromagnetic radiation and said normal to said alignment surface, said at least one beam(s) of spectroscopic polarized electromagnetic radiation being caused to reflect from said alignment surface of said optically thick material system and into said reflection detector system;

d. at said at least one angle of incidence and at more than two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining reflection detector system mediated experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface;

e. simultaneously providing a mathematical model of said optically thick material system which includes as parameters therein at least:

real and imaginary components for each of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions refractive indicies;

sufficient rotation about a normal to an alignment surface, and deviation from alignment with said alignment surface angle parameters to define the orientations of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies, and orientation of the optical axis, with respect to the alignment surface; and

Euler angles relating material system angles to a laboratory frame of reference; and

f. via application of a mathematical regression technique, evaluating parameters in said mathematical model to provide a best-fit to acquired experimental data.

14. A method of evaluating mathematical model parameters describing directions and magnitudes of real and imaginary components of orthogonally related Kramers-Kroenig consistent complex dielectric functions or refractive indicies in a optically thick material system which presents with an optical axis oriented in a selection from the group consisting of:

in-plane; and
out-of-plane;

with respect to an alignment surface thereof, said optically thick material system being biaxial in that corresponding real and corresponding imaginary components of said orthogonally related optically thick material system characterizing diagonalized tensor:

$$\tilde{\varepsilon}(E) = \begin{bmatrix} \varepsilon_{sc} & 0 & 0 \\ 0 & \varepsilon_{sc} & 0 \\ 0 & 0 & \varepsilon_{pc} \end{bmatrix}$$

complex dielectric functions or refractive indicies, are unequal in magnitude;

said method comprising, in any functional order, the steps of:

a. providing an optically thick material system which presents with Kramers-Kroenig consistent complex dielectric functions or refractive indicies and with an optical axis oriented either in-plane or out-of-plane with respect to an alignment surface thereof, said optically thick material system being uniaxial in that corresponding real and corresponding imaginary components of said orthogonally related optically thick material system characterizing diagonalized tensor:

$$\tilde{\varepsilon}(E) = \begin{bmatrix} \varepsilon_{sc} & 0 & 0 \\ 0 & \varepsilon_{sc} & 0 \\ 0 & 0 & \varepsilon_{pc} \end{bmatrix}$$

complex dielectric functions or refractive indicies are unequal in magnitude;

b. placing said optically thick material system into a system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface, said system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface comprising a reflection detector system;

c. selecting at least one spectroscopic polarized electromagnetic beam(s) of radiation to at least partially comprise wavelengths for which said optically thick material system is non-transparent, and causing said at least one beam(s) of spectroscopic polarized electromagnetic radiation to impinge on said alignment surface of said optically thick material system, at at least one angle(s) of incidence removed from a normal to said alignment surface, in plane(s) of incidence which include the locus of said beam of spectroscopic polarized electromagnetic radiation and said normal to said alignment surface, said at least one beam(s) of spectroscopic polarized electromagnetic radiation being caused to reflect from said alignment surface of said optically thick material system and into said reflection detector system;

d. at at least two angles of incidence and at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining reflection detector system mediated experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface;

e. simultaneously providing a mathematical model of said

optically thick material system which includes as parameters therein at least:

real and imaginary components for each of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies;

sufficient rotation about a normal to an alignment surface, and deviation from alignment with said alignment surface angle parameters to define the orientations of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies, and orientation of the optical axis, with respect to the alignment surface; and

Euler angles relating material system angles to a laboratory frame of reference; and

f. via application of a mathematical regression technique, evaluating parameters in said mathematical model to provide a best-fit to acquired experimental data.

15. A method of evaluating mathematical model parameters as in Claim 1, in which the wavelengths selected, for which said optically thick material system is non-transparent, are in the infrared range of 5 to 40 microns.

16. A method of evaluating mathematical model parameters as in Claim 12, in which the wavelengths selected, for which said optically thick material system is non-transparent, are in the infrared range of 5 to 40 microns.

17. A method of evaluating mathematical model parameters as in

Claim 13, in which the wavelengths selected, for which said optically thick material system is non-transparent, are in the infrared range of 5 to 40 microns.

18. A method of evaluating mathematical model parameters as in Claim 14, in which the wavelengths selected, for which said optically thick material system is non-transparent, are in the infrared range of 5 to 40 microns.

19. A method of evaluating mathematical model parameters describing Euler angles and directions, and magnitudes of real and imaginary components, of orthogonally related Kramers-Kroenig consistent complex dielectric functions or refractive indicies in an optically thick material system which presents with an optical axis oriented in a selection from the group consisting of:

in-plane; and
out-of-plane;

with respect to an alignment surface thereof;

said method comprising, in any functional order, the steps of:

a. providing an optically thick material system which presents with Kramers-Kroenig consistent complex dielectric functions or refractive indicies and with an optical axis oriented either in-plane or out-of-plane with respect to an alignment surface thereof;

b. placing said optically thick material system into a system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface, said system for directing at least one

spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface comprising a reflection detector system;

c. selecting at least one spectroscopic polarized electromagnetic beam(s) of radiation to at least partially comprise wavelengths for which said optically thick material system is non-transparent, and causing said at least one beam(s) of spectroscopic polarized electromagnetic radiation to impinge on said alignment surface of said optically thick material system, at at least one angle(s) of incidence removed from a normal to said alignment surface, in plane(s) of incidence which include the locus of said beam of spectroscopic polarized electromagnetic radiation and said normal to said alignment surface, said at least one beam(s) of spectroscopic polarized electromagnetic radiation being caused to reflect from said alignment surface of said optically thick material system and into said reflection detector system;

d. at said at least one angle(s) of incidence and at at least two rotation angles of said optically thick material system around said normal to the alignment surface thereof, obtaining reflection detector system mediated experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface;

e. simultaneously providing a mathematical model of said optically thick material system which includes as parameters therein at least:

real and imaginary components for each of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies;

sufficient rotation about a normal to an alignment surface, and deviation from alignment with said alignment surface angle parameters to define the orientations of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies, and orientation of the optical axis, with respect to the alignment surface; and

Euler angles relating material system angles to a laboratory frame of reference; and

f. via application of a mathematical regression technique, evaluating parameters in said mathematical model to provide a best-fit to acquired experimental data.

20. A method of evaluating mathematical model parameters as in Claim 19, in which the wavelengths selected, for which said optically thick material system is non-transparent, are in the infrared range of 5 to 40 microns.

21. A method of evaluating mathematical model parameters describing Euler angles and directions, and magnitudes of real and imaginary components, of orthogonally related Kramers-Kroenig consistent complex dielectric functions or refractive indicies in an optically thick material system which presents with an optical axis oriented in a selection from the group consisting of:

in-plane; and
out-of-plane;

with respect to an alignment surface thereof, said optically thick material system being uniaxial in that corresponding real and corresponding imaginary components of at least two orthogonally related optically thick material system characterizing diagonalized tensor:

$$\vec{\varepsilon}(E)=\begin{bmatrix}\varepsilon_{sc} & 0 & 0\\ 0 & \varepsilon_{sc} & 0\\ 0 & 0 & \varepsilon_{pc}\end{bmatrix}$$

complex dielectric functions or refractive indicies are of equal magnitude, said method comprising, in any functional order, the steps of:

a. providing an optically thick material system which presents with Kramers-Kroenig consistent complex dielectric functions or refractive indicies and with an optical axis oriented either in-plane or out-of-plane with respect to an alignment surface thereof, said optically thick material system being uniaxial in that corresponding real and corresponding imaginary components of at least two orthogonally related optically thick material system characterizing diagonalized tensor:

$$\vec{\varepsilon}(E)=\begin{bmatrix}\varepsilon_{sc} & 0 & 0\\ 0 & \varepsilon_{sc} & 0\\ 0 & 0 & \varepsilon_{pc}\end{bmatrix}$$

complex dielectric functions or refractive indicies are of equal magnitude;

b. placing said optically thick material system into a system for directing at least one spectroscopic polarized

electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface, said system for directing at least one spectroscopic polarized electromagnetic beam(s) of radiation onto said alignment surface at at least one angle(s) of incidence removed from a normal to said alignment surface comprising a reflection detector system;

c. selecting at least one spectroscopic polarized electromagnetic beam(s) of radiation to at least partially comprise wavelengths for which said optically thick material system is non-transparent, and causing said at least one beam(s) of spectroscopic polarized electromagnetic radiation to impinge on said alignment surface of said optically thick material system, at at least one angle(s) of incidence removed from a normal to said alignment surface, in plane(s) of incidence which include the locus of said beam of spectroscopic polarized electromagnetic radiation and said normal to said alignment surface, said at least one beam(s) of spectroscopic polarized electromagnetic radiation being caused to reflect from said alignment surface of said optically thick material system and into said reflection detector system;

d. at said at least one angle(s) of incidence and at one rotation angle of said optically thick material system around said normal to the alignment surface thereof, obtaining reflection detector system mediated experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface;

e. from the data obtained in step d., determining Jones Matrix:

$$\begin{bmatrix} Epo \\ Eso \end{bmatrix} = \begin{bmatrix} Tpp & Tsp \\ Tps & Tss \end{bmatrix} \begin{bmatrix} Epi \\ Esi \end{bmatrix}$$

components and if the off-diagonal components are essentially zero, rotate the optically thick material system about a perpendicular to the alignment surface thereof, and proceeding to step f. and if not proceeding directly to step g.;

f. at said at least one angle(s) of incidence and at one rotation angle of said optically thick material system around said normal to the alignment surface thereof, obtaining reflection detector system mediated experimental reflection intensity data as a functions of wavelength and angle of incidence of said at least one beam of spectroscopic polarized electromagnetic radiation onto said optically thick material system alignment surface;

g. simultaneously providing a mathematical model of said optically thick material system which includes as parameters therein at least:

real and imaginary components for each of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies;

sufficient rotation about a normal to an alignment surface, and deviation from alignment with said alignment surface angle parameters to define the orientations of the orthogonally related, Kramers-Kroenig consistent tensor diagonal complex dielectric functions or refractive indicies, and orientation of the optical axis, with respect to the

alignment surface; and

Euler angles relating material system angles to a laboratory frame of reference; and

h. via application of a mathematical regression technique, evaluating parameters in said mathematical model to provide a best-fit to acquired experimental data.

22. A method of evaluating mathematical model parameters as in Claim 1 wherein, after providing optically thick material system, a screening step of evaluating of components of a selection from the group consisting of:

a material system representing Jones Matrix; and

a material system representing Mueller Matrix;

is practiced, followed by practicing a selection from the group consisting of:

continuing if said off-Diagonal terms are not essentially zero (0.0); and

if said off-Diagonal terms are essentially zero (0.0), first rotating the material system so that said Off-Diagonal terms become other than essentially zero (0.0).

23. A method of evaluating mathematical model parameters as in Claim 11 wherein, after providing said at least two optically thick material systems, a screening step of evaluating of components of a selection from the group consisting of:

a material system representing Jones Matrix; and

a material system representing Mueller Matrix;

is practiced, followed by practicing a selection from the group consisting of:

continuing if said off-Diagonal terms are not essentially zero (0.0); and

if said off-Diagonal terms are essentially zero (0.0), first rotating the material system so that said Off-Diagonal terms become other than essentially zero (0.0).

24. A method of evaluating mathematical model parameters as in Claim 13 wherein, after providing optically thick material system, a screening step of evaluating of components of a selection from the group consisting of:

a material system representing Jones Matrix; and

a material system representing Mueller Matrix;

is practiced, followed by practicing a selection from the group consisting of:

continuing if said off-Diagonal terms are not essentially zero (0.0); and

if said off-Diagonal terms are essentially zero (0.0), first rotating the material system so that said Off-Diagonal terms become other than essentially zero (0.0).

25. A method of evaluating mathematical model parameters as in Claim 14 wherein, after providing optically thick material system

system, a screening step of evaluating of components of a selection from the group consisting of:

a material system representing Jones Matrix; and

a material system representing Mueller Matrix;

is practiced, followed by practicing a selection from the group consisting of:

continuing if said off-Diagonal terms are not essentially zero (0.0); and

if said off-Diagonal terms are essentially zero (0.0), first rotating the material system so that said Off-Diagonal terms become other than essentially zero (0.0).

26. A method of evaluating mathematical model parameters as in Claim 19 wherein, after providing optically thick material system, a screening step of evaluating of components of a selection from the group consisting of:

a material system representing Jones Matrix; and

a material system representing Mueller Matrix;

is practiced, followed by practicing a selection from the group consisting of:

continuing if said off-Diagonal terms are not essentially zero (0.0); and

if said off-Diagonal terms are essentially zero (0.0), first rotating the material system so that said Off-Diagonal

terms become other than essentially zero (0.0).

27. A method of evaluating mathematical model parameters as in Claim 21 wherein, after providing optically thick material system, a screening step of evaluating of components of a selection from the group consisting of:

a material system representing Jones Matrix; and

a material system representing Mueller Matrix;

is practiced, followed by practicing a selection from the group consisting of:

continuing if said off-Diagonal terms are not essentially zero (0.0); and

if said off-Diagonal terms are essentially zero (0.0), first rotating the material system so that said Off-Diagonal terms become other than essentially zero (0.0).